

REMARKS

Claims 1-26 are pending in the present application. Claims 1, 10, 17 and 19 have been amended herein for minor clarification. Claims 23-26 have been added herein. Support for the new claims is found at page 5, lines 12-13 and 24-25.

Applicants' Response to Claim Rejections under 35 U.S.C. §102 and §103

The Office Action maintains the rejection of claims 1-2, 4-6, 9-12, 14, and 17-22 under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,579,808 **Cho et al.** (hereinafter referred to as **Cho**), and claims 3, 7-8, 13, and 15-16 under 35 U.S.C. 103(a) as being unpatentable over **Cho** in view of U.S. Patent No. 6,187,688 (**Ohkuni et al**).

Specifically, the Office Action states: "**Cho** teaches the use of SO₂ and He, as the etch gas mixture employed for the etching process performed. And the claims as recited use the same gas mixture for etching the AR/PR films." Applicants respectfully traverse.

In the present invention, a surface layer of sidewalls and a top wall of the resist pattern is etched. Accordingly, the etching gas of the present invention must include gas being able to etch the resist pattern. In claims 1, 10, 17 and 19, the etching gas must include the gas being able to etch the resist pattern because the etching gas etches the surface layer of the resist pattern. For example, the gas being able to etch the resist pattern is limited to O₂ gas in claims 2, 12, 18 and 20,

The Office Action states at the bottom line on page 2 that **Cho**, in col.3, lines 62-63, discloses that the mixture of etch gases includes oxygen. However, **Cho** merely states that in the first dry etch process 220, the SO₂ gas has reactivity lower than that of the O₂ gas. **Cho** states, in col. 3, lines 56-57, that the first dry etch process 220 is performed by employing a mixed gas of SO₂ and

He as an etch gas. The etch gas does not include oxygen. O₂ gas has reactivity higher than that of SO₂ as **Cho** states. Therefore, if the etch gas used in the first etch process included oxygen, sidewalls of the resist pattern 208 shown in **Cho's** Fig.3B would be etched. As a result, the purpose of making a dimension of b2 smaller than a dimension of a2 as shown in Fig.3C cannot be accomplished (see col. 4, lines 15-17). The etch gas of **Cho** cannot include oxygen.

Further, in regard to the Examiner's assertion that the features upon which applicant relies are not recited in the rejected claims, applicants submit that although it is not specifically recited in the claims to increase the etching hole, it is clearly recited in the claims to etch the sidewall of the resist pattern. In the present invention, the sidewall of the resist pattern is etched by using the mixture gas comprising the first gas and SO₂. In the result, the resist pattern shrinks.

In **Cho's** invention, the resist pattern 208 shown in Fig.3B does not shrink, but the polymer sidewall 210 is formed on the exposed side of the AR coating layer 207. Forming the polymer sidewall 210 results in the same effect as spreading the resist pattern 208. The step of etching the sidewall of the resist pattern in the claimed invention produces exactly the contrary effect to the step of forming the polymer sidewall 210. **Cho** does not disclose the step of etching the sidewall of the resist pattern.

Cho specifically teaches that the photoresist pattern 208 is formed with opening a2 prior to the first dry etching step. See col. 3, lines 44-52. **Cho** specifically teaches that during the first dry etch step "[t]he SO₂ gas has no lateral etch properties..." See Col.3, lines 63-64 (emphasis added). This is further evidenced by the disclosure of the opening a2 prior to etching in Fig. 3A and subsequent to etching in Fig. 3C. The size of opening a2 remains constant in the

Figures. Hence, **Cho** expressly teaches that the lateral surfaces of the photoresist 208 are not etched.

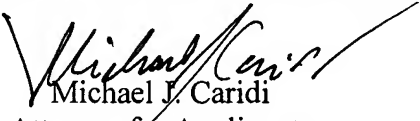
Applicants' independent claims 1, 10, 17 and 19 state "...etching a surface layer of sidewalls... of the resist pattern..." using the gas mixture. (emphasis added). Hence, the claims as presently drafted are distinct from the disclosures of **Cho**. Wherefore, applicants respectfully submit that **Cho** does not teach nor suggest each and every limitation of the claimed invention.

In view of the aforementioned amendments and accompanying remarks, Applicants submit that that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,
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